STATE OF SOUTH CAROLINA

In Re:

Annual Review of Base Rates For Fuel Costs for Duke Energy Carolinas, LLC

BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA

COVER SHEET

DOCKET NUMBER: 2008-3-E

(Please type or print)

Submitted by: Bonnie D. Shealy

Address: Robinson, McFadden & Moore, P.C.
PO Box 944
Columbia, SC 29202

SC Bar Number: 11125

Telephone: (803) 779-8900

Fax: (803) 252-0724

Other:

Email: bshealy@robinsonlaw.com

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DOCKETING INFORMATION (Check all that apply)

☐ Emergency Relief demanded in petition ☐ Request for item to be placed on Commission's Agenda expeditiously

☒ Other: Testimony of Thomas C. Geer

INDUSTRY (Check one)	NATURE OF ACTION (Check all that apply)		
☒ Electric	☐ Affidavit	☐ Letter	☐ Request
☐ Electric/Gas	☐ Agreement	☐ Memorandum	☐ Request for Certificatio
☐ Electric/Telecommunications	☐ Answer	☐ Motion	☐ Request for Investigatioı
☐ Electric/Water	☐ Appellate Review	☐ Objection	☐ Resale Agreement
☐ Electric/Water/Telecom.	☐ Application	☐ Petition	☐ Resale Amendment
☐ Electric/Water/Sewer	☐ Brief	☐ Petition for Reconsideration	☐ Reservation Letter
☐ Gas	☐ Certificate	☐ Petition for Rulemaking	☐ Response
☐ Railroad	☐ Comments	☐ Petition for Rule to Show Cause	☐ Response to Discovery
☐ Sewer	☐ Complaint	☐ Petition to Intervene	☐ Return to Petition
☐ Telecommunications	☐ Consent Order	☐ Petition to Intervene Out of Time	☐ Stipulation
☐ Transportation	☐ Discovery	☒ Prefiled Testimony	☐ Subpoena
☐ Water	☐ Exhibit	☐ Promotion	☐ Tariff
☐ Water/Sewer	☐ Expedited Consideration	☐ Proposed Order	☐ Other:
☐ Administrative Matter	☐ Interconnection Agreement	☐ Protest	
☐ Other:	☐ Interconnection Amendment	☐ Publisher's Affidavit	
	☐ Late-Filed Exhibit	☐ Report	

BEFORE THE

PUBLIC SERVICE COMMISSION OF

SOUTH CAROLINA

DOCKET NO. 2008-3-E

In the Matter of	)	
Annual Review of Base Rates	)	**TESTIMONY OF**
for Fuel Costs for	)	**THOMAS C. GEER**
Duke Energy Carolinas, LLC	)	
	)	

Q. PLEASE STATE YOUR NAME, ADDRESS AND POSITION.

A. My name is Thomas C. Geer. My business address is 526 South Church Street, Charlotte, North Carolina. I am Vice President of Nuclear Engineering for Duke Energy Carolinas, LLC ("Duke Energy Carolinas" or the "Company").

Q. WHAT ARE YOUR PRESENT RESPONSIBILITIES AT DUKE ENERGY CAROLINAS?

A. As Vice President of Nuclear Engineering, I am responsible for core physics, safety analysis, fuel mechanical & thermal hydraulic performance, dose analysis, the mixed oxide (MOX) fuel project, nuclear fuel purchasing, and spent fuel management for Oconee, McGuire, and Catawba nuclear stations.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from the Texas A&M University with Bachelor of Science and Master of Science degrees in nuclear engineering. I began my career at Duke Energy Carolinas (formerly Duke Power Company) in 1982 and have held a variety of technical and leadership roles with both Duke Energy Carolinas and Duke Engineering & Services, Inc., including positions at McGuire and Catawba nuclear stations, the Yucca Mountain Project in Nevada, and the Hanford Tank Farms near Richland, Washington. I assumed my current role in 2004. I am a registered professional engineer in the states of North Carolina and South Carolina.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to (1) provide information regarding the Company's nuclear fuel purchasing practices, (2) provide costs for the test period, and (3) describe changes forthcoming in the projected period.

Q. YOUR TESTIMONY INCLUDES 2 EXHIBITS. WERE THESE EXHIBITS PREPARED BY YOU OR AT YOUR DIRECTION AND UNDER YOUR SUPERVISION?

A. Yes. These exhibits were prepared at my direction and under my supervision, and consist of Geer Exhibit 1, Graphical Representation of the Nuclear Fuel Process and Geer Exhibit 2, Nuclear Fuels Procurement Practices.

Q. MR. GEER, PLEASE DESCRIBE THE COMPONENTS THAT MAKE UP NUCLEAR FUEL.

A. In order to prepare uranium for use in a nuclear reactor, it must be processed from an ore to a ceramic fuel pellet. This process is commonly broken into four distinct industrial stages: (1) mining and milling, (2) conversion, (3) enrichment, and (4) fabrication. This process is illustrated graphically in Geer Exhibit 1.

Uranium is usually mined by either surface (open cut) or underground mining techniques, depending on the depth of the ore deposit. The ore is then sent to a mill where it is crushed and ground-up before the uranium is extracted by leaching, the process in which either a strong acid or alkaline solution is used to dissolve the uranium. Once dried the uranium oxide (U_3O_8) concentrate, often referred to as yellowcake, is packed in drums for transport to a conversion facility. Alternatively, uranium may be mined by in situ leach (ISL), in which oxygenated groundwater is circulated through a very porous ore body to dissolve the uranium and bring it to the surface. ISL may also use slightly acid or alkaline solutions to keep the uranium in solution. The uranium is then recovered from the solution in a mill to produce U_3O_8.

After milling, the U_3O_8 must be chemically converted into uranium hexafluoride (UF_6). This intermediate stage is known as conversion, and it produces the feedstock required in the isotopic separation process.

Naturally occurring uranium primarily consists of two isotopes, 0.7% U-235 and 99.3% U-238. Most of this country's nuclear reactors (including those of the Company) require U-235 concentrations in the 3-5% range to operate a complete cycle of 18 to 24 months between refueling outages. The process of increasing the concentration of U-235 is known as enrichment. The two commercially available enrichment processes, gaseous diffusion and gas centrifuge, first heat the UF_6 to create a gas. Then, using the mass differences between the uranium isotopes, the natural uranium is separated into two gas streams, one being enriched to the desired level of U-235, known as low enriched uranium, and the other being depleted in U-235, known as tails.

Once the UF6 is enriched to the desired level, it is converted to uranium dioxide (UO_2) powder and formed into pellets. This process and subsequent steps of inserting the fuel pellets into fuel rods and bundling the rods into fuel assemblies for use in nuclear reactors is referred to as fabrication. New fuel assembly orders are planned for cycle lengths of approximately eighteen months. The length of a cycle is the duration of time between when a unit starts up after refueling and when it starts up after its next refueling.

For fuel batches recently loaded into Duke Energy Carolinas' reactors, uranium concentrates has represented approximately 30% of the total direct fuel cost. Conversion services, enrichment services, and fabrication services have represented approximately 5%, 45%, and 20% of the total direct fuel cost, respectively. The Company expects that the uranium concentrates component will increase its relative percentage of total direct fuel cost in the future because of recent market price increases experienced in this sector.

Q. PLEASE PROVIDE A SUMMARY OF DUKE ENERGY CAROLINAS' NUCLEAR FUEL PROCUREMENT PRACTICES.

A. As set forth on Geer Exhibit 2, Duke Energy Carolinas' nuclear fuel procurement practices involve computing near and long-term consumption forecasts, establishing target inventory levels, projecting required annual fuel purchases, qualifying suppliers, requesting proposals, negotiating a portfolio of spot and long term supply contracts from diverse sources of supply, assessing spot market opportunities and monitoring deliveries against contract commitments. Duke Energy Carolinas relies extensively on long term contracts to cover the largest portion of its forward requirements in each of the four industrial stages of the nuclear fuel cycle. By staggering long term contracts over time, the Company's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets, which has the effect of smoothing out the Company's exposure to price volatility. Diversifying fuel suppliers reduces the Company's exposure to possible disruptions from any single source of supply.

Q. MR. GEER, WHAT CHANGES HAVE OCCURRED IN THE UNIT COST OF THE VARIOUS STAGES OF NUCLEAR FUEL DURING THE TEST PERIOD?

A. In terms of market prices, the most prominent change has occurred in the uranium concentrates sector, where spot market prices for uranium concentrates increased nearly twenty-fold from the market lows which occurred in calendar year 2000 to historic market highs just prior to the test period. However, during the test period, spot market prices decreased to $60.00/lb. The impact of the market prices on the Company during the test period was mitigated by contracts negotiated prior to the test period at a time when market prices were lower. The average unit cost of the Company's purchases of uranium concentrates actually decreased from $29.51/lb in the prior reporting period to $25.65/lb in the test period - notably less than the average spot market price in the same period.

Industry consultants expect spot market prices to remain high in comparison to historic norms as exploration, mine construction, and production gear up. Also, as the Company's current contracts expire, they will be replaced with contracts at higher market prices. These higher prices will be reflected in future periods as fuel assemblies using such uranium are fabricated and loaded into the Company's reactors.

Market prices for enrichment have increased approximately eighty percent since market lows experienced in calendar year 2000. At the beginning of the test period, the market price was $139/SWU and increased to $149/SWU by the end of the test period. The impact of these higher market prices on the Company during the test period was mitigated by contracts negotiated prior to the test period at a time when market prices were lower. One hundred percent of the Company's enrichment purchases during the test period were delivered under long term contracts negotiated at lower market prices prior to the test period, which mitigated the impact of higher market prices on the Company during the test period. The average unit cost of enrichment purchased by Duke Energy Carolinas in the test period was $101/SWU which increased from $94/SWU in the prior reporting period, yet remained well below spot market prices during the test period. This increase was due to the expiration of legacy contracts which were replaced with contracts at higher market prices, a trend that will continue into the future. These higher prices will be reflected in future periods as fuel assemblies using such enrichment are fabricated and loaded into the Company's reactors.

Market prices for fabrication have been reasonably stable in recent years and the Company's forward requirements are covered under existing long term contracts through and beyond the billing period. The unit cost for fabrication services purchased by the Company in the test period was comparable to that purchased in the prior test period.

Although the unit cost of the Company's purchases of conversion increased during the test period, these increased costs have a limited impact on the overall reported fuel expense rate because the dollar amounts for these purchases represent a relatively minor portion of the Company's total direct fuel cost.

Q. WHAT CHANGES DO YOU EXPECT IN THE COMPANY'S NUCLEAR FUEL COSTS IN 2008 AND 2009?

A. Duke Energy Carolinas does not anticipate a significant increase in nuclear fuel expense through the projected period. Because fuel is typically expensed over two to three operating cycles – roughly three to five years - Duke Energy Carolinas' nuclear fuel expense in the projected period will be determined by the cost of fuel assemblies loaded into the reactors during the test period as well as prior periods. The costs of the fuel residing in the reactors during the test period will be predominantly based on contracts negotiated prior to the recent market price increases. As a result, fuel expense during the projected period is expected to remain in the 0.4 to 0.5 cents per kWh range over the period. As fuel with a low cost basis is discharged from the reactor and lower priced legacy contracts expire, nuclear fuel expense is expected to increase in the future.

Q. WHAT STEPS IS THE COMPANY TAKING TO PROVIDE STABILITY IN ITS NUCLEAR FUEL COSTS AND TO MITIGATE AGAINST PRICE INCREASES IN THE VARIOUS COMPONENTS OF NUCLEAR FUEL?

A. As I discussed earlier and as described in Geer Exhibit 2, Duke Energy Carolinas relies extensively on long term contracts to cover the largest portion of its forward requirements in each of the four industrial stages of the nuclear fuel cycle. By staggering long term contracts over time, the Company's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets, which has the effect of smoothing out the Company's exposure to price volatility.

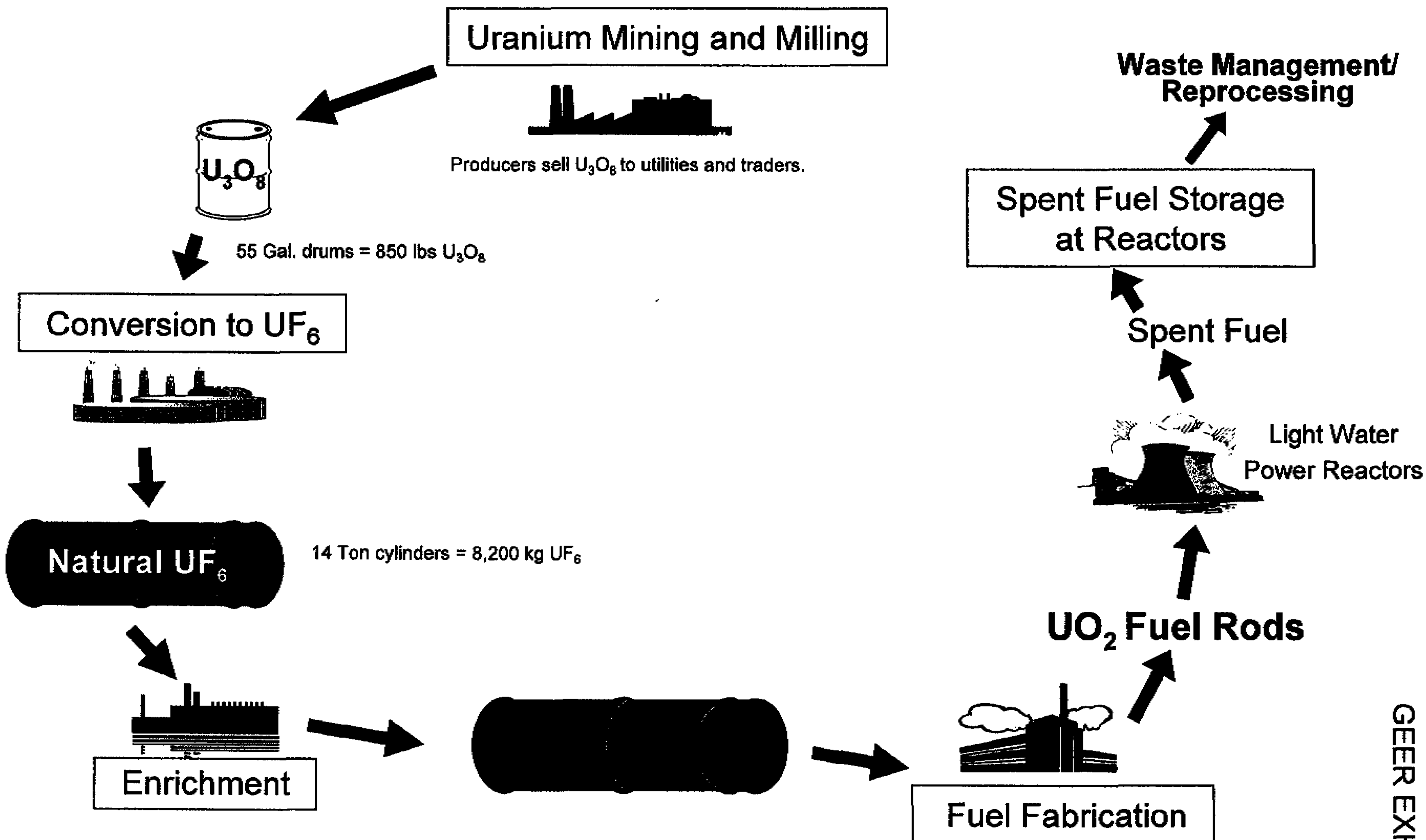
Success of the above strategy depends on the willingness of fuel suppliers to offer certain pricing mechanisms under long term contracts (*e.g.*, fixed prices, base escalated prices, or caps on market index prices). Along with the rise in uranium spot market prices prior to the previous test period, the Company found that suppliers were reluctant to offer these pricing mechanisms. Instead, uranium suppliers were offering contracts with delivery prices tied to future market prices with no ceilings and very high floor prices. As a result of this shift, the Company adjusted its strategy by purchasing uranium in the spot market and holding it to meet future requirements. Uranium suppliers are beginning to offer more reasonable pricing terms under long term contracts, which has allowed the Company to entertain opportunities to obtain suppliers under long term contracts again.

Although costs of certain components of nuclear fuel are expected to increase in future years, nuclear fuel costs on a kilowatt-hour basis will likely continue to be a fraction of the kilowatt-hour cost of fossil fuel. Therefore, customers will continue to benefit from the Company's diverse generation mix and the strong performance of its nuclear fleet through lower fuel costs than would otherwise result absent the significant contribution of nuclear generation to meeting customer demand.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

The Nuclear Fuel Cycle



GEER EXHIBIT 1

GEER EXHIBIT 2

Duke Energy Carolinas Nuclear Fuel Procurement Practices

The Company's nuclear fuel procurement practices are summarized below.

- Near and long-term consumption forecasts are computed based on factors such as: nuclear system operational projections given fleet outage/maintenance schedules, adequate fuel cycle design margins to key safety licensing limitations, and economic tradeoffs between required volumes of uranium and enrichment necessary to produce the required volume of enriched uranium.
- Nuclear system inventory targets are determined and designed to provide: reliability, insulation from short-term market volatility, and sensitivity to evolving market conditions. Inventories are monitored on an ongoing basis.
- On an ongoing basis, existing purchase commitments are compared with consumption and inventory requirements to ascertain additional needs.
- Qualified suppliers are invited to make proposals to satisfy additional or future contract needs.
- Contracts are awarded based on the most attractive evaluated offer, considering factors such as price, reliability, flexibility and supply source diversification/portfolio security of supply.
- Long term supply contracts are relied upon to fulfill the largest portion of forward requirements in each of the four industrial stages of the nuclear fuel cycle. By staggering long term contracts over time, the Company's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets, which has the effect of smoothing out the Company's exposure to price volatility.
- Spot market opportunities are evaluated from time to time to supplement long term contract supplies as appropriate based on comparison to other supply options.
- Delivered volumes of nuclear fuel products and services are monitored against contract commitments. The quality and volume of deliveries are confirmed by the delivery facility to which Duke Energy Carolinas has instructed delivery. Payments for such delivered volumes are made after Duke Energy Carolinas' receipt of such delivery facility confirmations.